

REMARKS

35 U.S.C. § 103

The Examiner has rejected claims 1-10, 12, 70-73, and 75-101 under 35 U.S.C. 103(a) as being unpatentable over WO 85/02175. This rejection is respectfully traversed.

In the Office Action dated September 9, 2002, wherein the Examiner first described the present rejections under 35 U.S.C. 103(a), the Examiner asserted the following:

WO '175 discloses a detergent composition for use as biodegradable detergents wherein said compositions comprise C14 alcohols having branching at the 2-position and an additional methyl branch. The alcohols have a limited vicinal substitution and no di-substituted carbon chain atoms (i.e. quaternary carbon atoms). Note, see pages 5-7.

WO '175 lacks applicant's specific teachings of branches per molecule. It would have been obvious to one of ordinary skill in the art to expect similar characteristics and properties from the sulfated alcohols of WO '175 because they are the same compounds but different isomers. However, absent a showing to the contrary, it has been held that a *prima facie* case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities. "An obviousness rejection based on similarity in chemical structure and function entails the motivation of one skilled in the art to make a claimed compound, in the expectation that compounds similar in structure will have similar properties." *In re Payne*, 606 F.2d 303, 313, 203 USPQ 245, 254 (CCPA 1979). See *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963) and *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1991). Moreover, Compounds which are position isomers (compounds having the same radicals in physically different positions on the same nucleus) are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977). See also *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978) (stereoisomers *prima facie* obvious).

In the Office Action dated June 2, 2003, the Examiner asserted in addition:

Applicant argues that WO '175 does not provide how to produce the composition produced by applicant's method.

The examiner contends that the claims at hand are compositional claims. Furthermore, the branched products are taught and suggested by WO '175, wherein WO '175 teaches that most branches at the C2 are still methyl or ethyl groups (pg. 9, lines 1-2). **(This statement is incorrect. A reading of the whole paragraph shows that all of the isomers have 5 carbon chain branching at the C₂ position and that the referenced phrase refers to branching at positions other than C₂ in the isomers that are present only in the smallest amounts. All of the isomers described in Tables 3 and 4 have 5 carbon chain branching at the C₂ position.)**

Accordingly, the claims are not distinguishable over the art of record and the rejection is maintained for reasons of record.

The record reflects that the Examiner's primary argument for making the present rejections is the assertion by the Examiner that WO '175 discloses a C₁₄ alcohol that is structurally similar to the presently claimed compositions. Applicants respectfully submit that the Examiner's "structural similarity" rationale cannot support *prima facie* obviousness rejections of the present claims over WO '175.

Before discussing the inapplicability of the "structural similarity" obviousness rationale in the present application, Applicants note that even assuming arguendo that this "structural similarity" obviousness analysis is appropriate and further assuming arguendo that WO '175 discloses, as asserted by the Examiner, an isomer of the presently claimed compositions, these assumed facts would not automatically be conclusive proof of *prima facie* obviousness. MPEP 2144.09 states:

HOMOLOGY AND ISOMERISM ARE FACTS WHICH MUST BE CONSIDERED WITH ALL OTHER RELEVANT FACTS IN DETERMINING OBVIOUSNESS

Compounds which are position isomers (compounds having the same radicals in physically different positions on the same nucleus) . . . are generally of sufficiently close structural similarity that there is a presumed expectation that such compounds possess similar properties. . . .

Isomers having the same empirical formula but different structures are not necessarily considered equivalent by chemists skilled in the art and therefore are not necessarily suggestive of

each other. *Ex parte Mowry*, 91 USPQ 219 (Bd. App. 1950) (claimed cyclohexylstyrene not *prima facie* obvious over prior art isohexylstyrene). Similarly, homologs which are far removed from adjacent homologs may not be expected to have similar properties. *In re Mills*, 281 F.2d 218, 126 USPQ 513 (CCPA 1960) (prior art disclosure of C₈ to C₁₂ alkyl sulfates was not sufficient to render *prima facie* obvious claimed C₁ alkyl sulfate).

Homology and isomerism involve close structural similarity which must be considered with all other relevant facts in determining the issue of obviousness. . . . Homology should not be automatically equated with *prima facie* obviousness because the claimed invention and the prior art must each be viewed “as a whole.” . . .

(emphasis added and citations omitted).

Applicants first note that the compound of WO '175 and the claimed compositions are not, as the Examiner seems to suggest, position isomers as defined above in the quote from MPEP 2144.09 because position isomers according to MPEP 2144.09 are “compounds having the same radicals in physically different positions on the same nucleus.” As discussed in detail below, such similarities do not exist in the present case. More importantly, based on MPEP 2144.09, if it is assumed arguendo that a “structural similarity” obviousness analysis is appropriate in the present case and if it is further assumed arguendo that WO '175 discloses, as asserted by the Examiner, an isomer of the presently claimed compounds, the assumed isomerism would be only one factor out of many factors to be considered in the determination of obviousness. The Examiner still must consider an invention as a whole. Therefore, the Examiner must consider all of the limitations of the present claims (for example, limitations relating to branching) and must not simply ignore all of the limitations not disclosed by WO '175. Applicants respectfully submit that a bare assertion that one isomer renders all other isomers obvious is inappropriate.

No Prima Facie Case for Obviousness has Been Established

As previously mentioned, Applicants respectfully assert that the Examiner’s “structural similarity” arguments cannot support *prima facie* obviousness rejections of the present claims over WO '175. Applicants submit that the “structural similarity” obviousness analysis is applicable only in situations wherein prior art discloses structures that are very close to claimed structures. Applicants point out that the title of MPEP 2144.09 is “Close Structural Similarity

Between Chemical Compounds (Homologs, Analogues, Isomers)" (emphasis added) and that the first statements within that section are as follows:

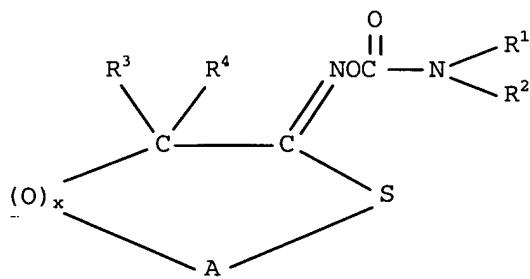
REJECTION BASED ON CLOSE STRUCTURAL SIMILARITY IS FOUNDED ON THE EXPECTATION THAT COMPOUNDS SIMILAR IN STRUCTURE WILL HAVE SIMILAR PROPERTIES

A *prima facie* case of obviousness may be made when chemical compounds have very close structural similarities and similar utilities.

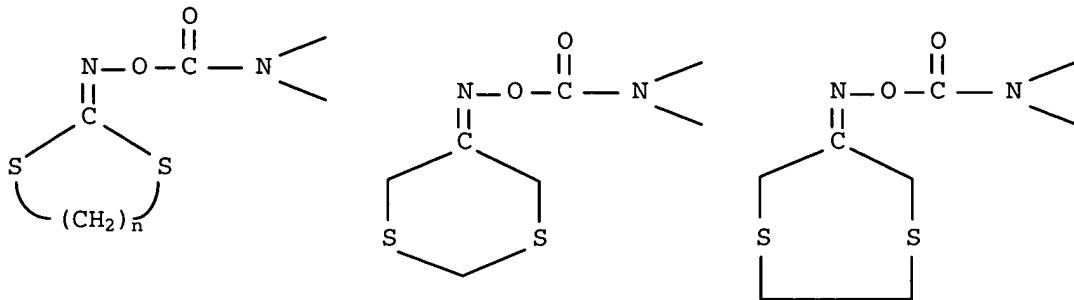
(emphasis added).

To illustrate the Applicants' position on the meaning of "very close structural similarity," without commenting on the correctness or currency of other holdings or discussions therein, Applicants refer to the cases cited by the Examiner in rejecting the present claims based on structural similarity: *In re Payne*, 606 F.2d 303, 203 USPQ 245(CCPA 1979); *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963); *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1991); *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977); *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978). In each of these cases, specific molecular structures (individual molecule graphically illustrated, specifically named, or represented by formula, etc.) capable of bond-by-bond and atom-by-atom comparison were present both in the claims and in the prior art upon which "close structural similarity" obviousness rejections were based. See *In re Payne*, 606 F.2d 303, 203 USPQ 245 (CCPA 1979); *In re Papesch*, 315 F.2d 381, 137 USPQ 43 (CCPA 1963); *In re Dillon*, 919 F.2d 688, 16 USPQ2d 1897 (Fed. Cir. 1991); *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977); *In re May*, 574 F.2d 1082, 197 USPQ 601 (CCPA 1978).

For example, in *In re Payne*, 606 F.2d 303, 203 USPQ 245 (CCPA 1979), claim 1 recited the structural formula:



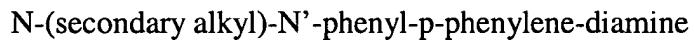
“Structural similarity” obviousness rejections under appeal had been based upon prior art disclosing the following structures:



As another example, in *In re Wilder*, 563 F.2d 457, 195 USPQ 426 (CCPA 1977), also cited by the Examiner, claim 1 was as follows:

1. N-(1,4-dimethylamyl)-N'-phenyl-p-phenylenediamine.

Claim 1 had been rejected as structurally obvious over prior art disclosing:



in which the secondary alkyl group contains from three to eleven carbon atoms, up to and including seven carbon atoms being particularly effective, and specifically including N-(1,3-dimethyl-butyl)-N-phenyl-p-phenylene-diamine and N-(1-methylhexyl) N'-phenyl-p-phenylenediamine. *Id.*

In all of the cases cited by the Examiner in support of the Examiner's structural obviousness rejections, the distinct structural similarities and differences between the prior art in those cases and the claims of those cases were clearly and readily capable of visualization, characterization, and enumeration. Applicants assert that the “structural similarity” obviousness analysis is most readily applicable in these types of situations where both prior art and claims show specific molecular structures (individual molecule graphically illustrated, specifically named, or represented by formula, etc.). Bond-by-bond and atom-by-atom comparisons inherently conducted in such situations make it possible to determine whether molecular structural similarities are extremely numerous and molecular structural differences are very insignificant, such as where the types of molecular structural differences present are well-known to tend to have no significant effect upon molecular properties. In instances of extremely numerous structural similarities coupled with very insignificant differences, it might be said that one of ordinary skill in the art would be motivated to arrive at claimed compounds by making

insignificant modifications to known prior art compounds, retaining in the modified compounds most of the structural features of the original known compounds. The motivation to make the insignificant modifications while retaining most other structural features is based upon the desire to create modified compounds having the same properties as the original known prior art compounds. One of ordinary skill in the art would expect the properties of insignificantly modified compounds to be the same as properties of the known prior art compounds if the structural similarities between the modified and known compounds are numerous enough.

This reasoning is based on numerous molecular structural similarities coupled with very insignificant molecular structural differences. If these factors are present, very insignificant differences can be ignored, under appropriate circumstances, as obvious modifications. Absent sufficiently numerous specifically identifiable similarities or in the presence of differences that are not insignificant, Applicants contend that the differences should not be ignored. The "structural similarity" obviousness analysis should be reserved for situations involving very close structural similarities (MPEP 2144.09), and in all other instances the Examiner must point to teachings or suggestions of each and every limitation of the claims.

In asserting obviousness in the present application, the Examiner has made and relied upon general assertions of "structural similarity," but the Examiner has not pointed to very close and numerous structural similarities between the presently claimed compositions and compositions of WO '175. The general assertion of structural similarity made by the Examiner is limited to "because they are the same compounds but different isomers" (no showing of why this is so) certainly cannot be said to rise to the level of numerous structural similarities typically observed when known and claimed specific molecular structures (individual molecule graphically illustrated, specifically named, or represented by formula, etc.) have been compared in a bond-by-bond and atom-by-atom fashion and found to be obvious variants of each other. Furthermore, the differences between compositions of WO '175 and the present claims, which differences have been ignored by the Examiner, are not insignificant. The Examiner has ignored limitations of the present claims which are not well-known in the art to have little effect on properties.

The branched alcohols described in the reference are all 2-alkyl branched compounds. They have to be by virtue of the description in the application on pages 4 through 7 and also by

the description of the process for making these materials, for example, at page 23. See also Table 3 on page 38 wherein all of the isomers shown are 2-alkyl branched alcohols.

Furthermore, the branches which extend from the 2 position on the chain must also be higher alkyl chains than just methyl or ethyl. The description of these alcohols shown on page 6 requires that the branch have 5 carbon atoms. This is the primary product of the invention of the reference. Claim 1 describes the branch as having from 3 to 6 carbon atoms. Obviously, this is not methyl or ethyl.

Attached hereto as Attachment A is a report of additional experiments that were done and submitted to the PCT Examiner in 1998. 2-alkyl branched alcohols having 14, 15, and 16 carbon atoms were made with methyl, ethyl, propyl, butyl, or hexyl branches. Sulfates of these materials were made and tested according to the procedure described to determine multisebum soil removal and triolein soil removal. All of the experiments which can be compared directly show that better results in terms of soil removal are achieved with methyl or ethyl groups than can be achieved with propyl, butyl, or hexyl groups.

This data shows that "very close structural similarity" does not exist in this case since the reference describes 100 percent 2-alkyl branching with long chains and the present invention describes mostly shorter chain branching which does not have to appear at the 2 position.
Indeed, claims 77, 85, and 94, and all of their dependent claims, require that 5 to 25 percent of the branching is at the C₂ position relative to the hydroxyl carbon atom. This means that they cannot have 100 percent branching at the C₂ position.

The reference does not describe materials such as those that are claimed in the present application and thus it cannot suggest that improved soil removal could be achieved by modifying the longer chain 100 percent C₂ position branched alcohols described therein by reducing the C₂ branching to as little as 5 percent and having only mostly lower chain branches.

The inventors herein were recently honored for this invention at the Southwest Regional Industrial Innovation Awards Program Symposium of the American Chemical Society (more about that later) -- a copy of the announcement is attached hereto as Attachment B. A copy of the presentation which was given at the Awards Ceremony is also enclosed herewith as Attachment C. The presentation contains several slides which are relevant to the question whether or not the differences between the alcohols of the reference and the presently claimed

alcohols are "significant" in that whatever structural similarity exists between the two sets of alcohols is not sufficient to predict the properties of the presently claimed alcohols from what is known about the alcohols of the reference.

Slide 16 relates to the Krafft temperature of selectively branched alcohol sulfates within the scope of the present claims (the top 3 alcohols in the slide), sulfates of alcohols which have almost all ethyl or methyl branching at the C₂ position (the fifth and sixth alcohols in the slide), and the sulfate of one linear C₁₆ alcohol (the last alcohol in the slide). The Krafft temperature is the temperature at which the mixture containing the alcohol sulfates becomes clear and is an indication of solubility. Since cold water detergency is one of the goals of the present invention, it is better when the Krafft temperature is lower. As can be seen, all three of the selectively branched alcohol sulfates of the present invention have considerably lower Krafft temperature than the sulfates where almost all of the branching is 2-ethyl or 2-methyl (which are most akin to the alcohol sulfates described in the reference). This is another indication that the previously discussed differences in structure between the alcohol of the reference and the presently claimed alcohol do make a significant difference and that the properties of sulfates of the present invention cannot be predicted from the disclosure of the reference.

Slide 17 shows another physical property difference between the branched alcohol sulfates. The calcium tolerance of the branched alcohol sulfates of the present invention is much higher than the calcium tolerance of the 2-ethyl and 2-methyl branched alcohol sulfates. Slide 19 clearly shows that the detergency performance (at 10°C and 150 ppm water hardness) of the branched alcohol sulfates of the present invention is much better than the detergency performance of the 2-ethyl branched alcohol sulfate and the linear alcohol sulfate. This data also shows that the structural differences between the two sets of alcohols give different physical properties and that the properties of the sulfates of the present invention cannot be predicted from the disclosure of the reference.

A portion of this data appears in the article "Solution and Performance Properties of New Biodegradable High-Solubility Surfactants" in Tables 8, 9 and 11 wherein branched alcohol sulfates of this invention are referred to as random methyl alcohol sulfates (RMC15, RMC1617, RMC18). This article, which is enclosed herewith as Attachment D, was published as part of the proceedings of the 5th World Surfactants Congress in 2000.

Another slide on detergency performance of these alcohol sulfates which was not part of the presentation (which is also enclosed herewith as Attachment E) includes detergency performance data for alcohol sulfates which contain almost 100 percent either 2-hexyl, 2-butyl, 2-ethyl, or 2-methyl branching. Looking at this slide, it can be seen that the C₁₅ and C_{16, 17} alcohol sulfates have greatly enhanced detergency performance as compared to the branched alcohol sulfates which have almost 100 percent branching at the C₂ position and particularly much better detergency performance than the 2-hexyl and 2-butyl branched alcohol sulfates. The C₁₈ selectively branched alcohol sulfate also had better detergency performance than all of the others but the difference is not quite as dramatic. Again, this data shows that the structural differences between the branched alcohol sulfates result in different physical properties which cannot be predicted.

Very close structural similarity does not exist in this case and very close structural similarity is required for the analysis applied by the Examiner in the present rejections. It is insufficient for the Examiner to rely on broad assertions that the claimed compositions and the compositions of WO '175 generally fall within the same class or are generally related. Therefore, the guidelines associated with very close structural similarity should not be applied to the present claims, and there is no justification for ignoring differences between the present claims and compositions of WO '175. No *prima facie* case for obviousness has been established.

No Suggestion or Teaching of the Claim Limitations is Shown

No obvious modification of the compositions of WO '175 would result in a composition that satisfies each and every limitation of the present claims. Only major modifications of the compositions of WO '175 could result in a composition characterized by each and every limitation of the present claims. Furthermore, WO '175 contains no suggestion that would lead a person of ordinary skill in the art from the compositions of WO '175 to the compositions characterized by each and every limitation of the present claims. The only way that a person of ordinary skill in the art, beginning with WO '175, would be motivated to arrive at a composition satisfying each and every limitation of the present claims is by using the present claims as a blueprint and engaging in impermissible hindsight reconstruction.

Applicants assert that it is improper for the Examiner to distill the present claims down to the "gist" or "thrust" of the subject matter. See MPEP 2141.02. Such distillation disregards the

requirement of analyzing the subject matter of the claims “as a whole.” In order to consider the subject matter “as a whole,” the Examiner must consider each and every limitation of the present claims and must not ignore any limitations. Applicants respectfully urge the Examiner to carefully avoid sweeping conclusions that all alkyl branched primary alcohols of a certain rough “size,” or all compositions falling generally within any class or category resembling such alkyl branched primary alcohols, are automatically obvious in view of WO ‘175.

The Examiner has not pointed to teachings or suggestions of each and every limitation of claims 1, 70, 77, 85, and 94. For example,

- i) with respect to claim 1, the Examiner has not pointed to teachings or suggestions of the limitation “5% to 30% of the number of branches are ethyl branches.”
- ii) with respect to claim 70, the Examiner has not pointed to teachings or suggestions of the limitations “an average number of branches per molecule chain ranging from 0.7 to 2.1 and wherein less than 5% of the alcohol molecules in the composition are linear alcohols.”
- iii) with respect to claim 77, the Examiner has not pointed to teachings or suggestions of the limitations “wherein from 5-25% of the branching is at the C2 position relative to the hydroxyl carbon atom, and from 10% to 50% of the branches are located at the C3 position.”
- iv) with respect to claim 85, the Examiner has not pointed to teachings or suggestions of the limitation “5% to 25% of the number of branches are on the C2 atoms of the alcohol composition.”
- v) with respect to claim 94, the Examiner has not pointed to teachings or suggestions of the limitation “5% to 25% of the number of branches are on the C2 atoms of the alcohol composition.”

Therefore, the Examiner has not satisfied the burden of proof necessary to fulfill a *prima facie* case of obviousness of claims 1, 70, 77, 85, and 94. Similarly, because all of claims 2-10, 12, 71-73, 75-76, 78-84, 86-93, and 95-101 (all other claims presently rejected) depend from one of claims 1, 70, 77, 85 and 94, the Examiner also has not satisfied the burden of proof necessary to fulfill a *prima facie* case of obviousness of claims 2-10, 12, 71-73, 75-76, 78-84, 86-93, and 95-101 (all other claims presently rejected).

Independent Nonobviousness of Claims 77-101

Claims 77-101 and all other claims containing the limitation that from 5 to 25 percent of the branching in the primary alcohol composition or the biodegradable sulfate composition is at the C₂ position relative to the hydroxyl group are nonobvious independently of the other claims in this application. As discussed in detail above, the reference describes alcohols and sulfates which have 100 percent branching at the C₂ position. These claims in the present application specify that only from 5 to 25 percent of the branching in the alcohol or sulfate thereof can be at the C₂ position. The rest of the branching in the molecule can be and is spread out among the rest of the carbon atoms in the alcohol chain (randomly distributed—the terminology of Attachment D). This is described in Table 1 on page 32 and in the paragraph that starts at the bottom of page 32 and carries over to the top of page 33 of the specification. In all of the examples of the present invention, Examples 1-4, there is some ethyl branching at the C₂ position, some methyl branching at the C₂ position, and some branching at the C₃ position. The rest of the branching occurs at the C₄ position or there is no branching (a possibility which is made obvious by the fact that the average number of branches per molecule can be as low as 0.7).

The data discussed in detail above and included in the enclosures herewith clearly shows the superiority of branching at the C₂ position within the claimed range as opposed to 100 percent branching at the C₂ position as is the case for the alcohols and sulfates of the reference. The data on Krafft temperature, calcium tolerance, and the first set of detergency performance data clearly show the superiority of the alcohols and sulfates of the present invention as compared to 100 percent short chain branching at the C₂ position. The second set of detergency performance data also shows this but clearly shows the superiority of the branched alcohol sulfates of the present invention as compared to 100 percent longer chain C₂ branched (2-hexyl and 2-butyl) sulfates which are the only alcohols described in the reference.

The Applicants assert that the physical property and performance data discussed above clearly shows a significant difference and advantage for the branched alcohol sulfates of the present invention as opposed to those of the type described in the reference. The Applicants assert that this is sufficient evidence of nonobviousness to overcome any Section 103 rejection based on the reference.

Graham v. John Deere Co. Secondary Considerations

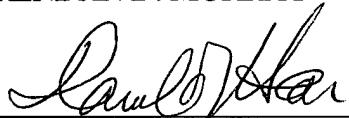
The secondary considerations objective indicia of nonobviousness include industry praise and commercial success. The Applicants submit the award that was given to the inventors of the present application as shown in Attachment B as evidence of industry praise for this invention. Also, the slides at the end of the presentation show that detergent products made using the alcohols of the present invention, specifically Tide® detergent, had been made and sold commercially by the Proctor & Gamble Company of Cincinnati, Ohio. The alcohols which are used to make these detergents are produced at a different facility than the world-scale olefin/alcohol plant referred to in the presentation which is currently not operating commercially. The Applicants assert that this evidence of commercial success is another indication that the invention as claimed herein is nonobvious.

Applicants respectfully request reconsideration and withdrawal of the rejections under 35 U.S.C. 103(a).

Respectfully submitted,

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